

## BRIEF REPORT

# Clinical Presentation of Attention-Deficit Hyperactivity Disorder Symptoms in Terms of Gender and Chronological Age

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### ABSTRACT

The present cross-sectional study aimed to evaluate Attention-deficit hyperactivity disorder (ADHD) symptoms in terms of gender and age. Based on convenience sampling, the data records of 1,184 children and adolescents with ADHD were gathered from various Child and Adolescent Psychiatry Clinics affiliated to Shiraz University of Medical Sciences (Shiraz, Iran). During 2010-2015, the patients had been interviewed face-to-face for ADHD diagnosis in accordance with the Diagnostic and Statistical Manual of Mental Disorders 4th Edition (DSM-IV) diagnostic criteria. The collected data were re-analyzed using parent-reported ADHD symptoms measured with the DSM-IV clinical symptoms checklist. Statistical analysis was performed using SPSS software with the Pearson correlation test, Chi-square test, and *t* test.  $P < 0.05$  was considered statistically significant.

The mean age of the participants was  $9.29 \pm 2.55$  years, 904 (76.40%) of whom were boys. The mean total score of hyperactivity-impulsivity in girls and boys was  $2.63 \pm 2.77$  and  $3.19 \pm 8.17$ , respectively. The mean total score of inattention in girls and boys was  $3.40 \pm 1.97$  and  $3.28 \pm 2.00$ , respectively. Age and gender were not associated with the symptoms of inattentive ADHD. The symptoms associated with hyperactivity-impulsivity had a significant association with age ( $P < 0.05$ ). The symptoms with a statistically significant association with gender were frigidity ( $P = 0.001$ ), often running about ( $P = 0.03$ ), and often difficulties with playing or leisure activities ( $P = 0.005$ ). The most common symptoms of inattentive ADHD in both boys and girls were “inattention to details or making careless mistakes” (47.6% and 54.3%, respectively) and “fails to finish work” (43.0% and 40.1%, respectively).

In contrast with the hyperactivity-impulsivity, the severity of inattention was not associated with age. The results of the present study indicated that while the ADHD screening questions for inattention could be the same for both genders, they should be different for hyperactivity-impulsivity.

**KEYWORDS:** Age, Attention-deficit hyperactivity disorder, Gender, Prevalence, Symptom assessment

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## INTRODUCTION

Attention-deficit hyperactivity disorder (ADHD) is one of the most common psychiatric disorders in children and adolescents.<sup>1,2</sup> The reported prevalence of ADHD among boys and girls is 13.6% and 6.5%, respectively. Such a difference might be related to different age categories, evaluation tools/methods, or diagnostic criteria.<sup>3</sup> While age has been suggested as a possible reason for the difference, age-specific diagnostic criteria could also play an important role.<sup>4</sup> In terms of the severity of continuum classes (mild, moderate, severe), ADHD is the extreme of the continuum rather than as discrete categories.<sup>5</sup>

The diagnostic stability of ADHD is another topic for consideration. ADHD diagnosis stability in a 5-year follow-up study was reported as poor (24.0%).<sup>4</sup> Symptoms such as inattention, hyperactivity, and impulsivity were reported as the risk factors for ADHD persistence.<sup>6,7</sup> Furthermore, gender appropriateness of the Diagnostic and Statistical Manual of Mental Disorders 4th Edition (DSM-IV), criteria for ADHD has been examined in various studies; though is still subject to controversy.<sup>8,9</sup> In a previous study, the participants (mothers of children with and without ADHD) rated overt aggression as boy-descriptive.<sup>10</sup> In another study, the DSM-IV ADHD subtypes did not show discrete subgroups with enough long-term stability to support the classification of distinct types of the disorder.<sup>11</sup> As a result, an alternative model based on dimensional modifiers to indicate the level of inattention and hyperactivity-impulsivity symptoms was suggested.<sup>11</sup> The main limitation of the majority of the past studies has been the inclusion of general population samples rather than clinical samples.<sup>7,8</sup> Consequently, impairment has not been assessed.

To the best of our knowledge, we present the first study that evaluates ADHD symptoms using DSM-IV diagnostic criteria and examines the association of the symptoms in terms of gender and age rather than using ADHD as a diagnosis.

## MATERIALS AND METHODS

In the present cross-section study, the data records of 1,184 children and adolescents with ADHD were collected, based on convenience sampling, from various Child and Adolescent Psychiatry Clinics affiliated to Shiraz University of Medical Sciences (Shiraz, Iran). The patients had been interviewed face-to-face during 2010-2015 in the presence of at least one parent, the one with the most information about the past medical condition of the child or adolescent. The inclusion criteria were an Iranian national aged 5.5-19 years and officially diagnosed with ADHD, according to DSM-IV diagnostic criteria by a board-certified child and adolescent psychiatrist. The exclusion criterion was a serious medical condition such as hypothyroidism, hyperthyroidism, clinically estimated mental retardation, deafness, and epilepsy. Note that part of the data was obtained from an ADHD databank<sup>12</sup> and re-analyzed. This ensured the inclusion of a higher sample size compared to previous studies.

The Persian version of the DSM-IV diagnostic criteria for ADHD was used to determine the ADHD symptoms.<sup>13-15</sup> The 18-item checklist includes 9 items on inattention and 9 items on hyperactivity-impulsivity. The checklist is scored based on a 4-point Likert scale ranging from 0 (never) to 3 (always). The validity and reliability of the checklist were confirmed in a previous study. The Cronbach's alpha for DSM-IV inattention and hyperactivity-impulsivity was 0.81 and 0.85, respectively.<sup>14</sup>

The study was approved by the Ethics Committee of Shiraz University of Medical Sciences, Shiraz, Iran (code: 1397.488). The confidentiality of any disclosed information was respected. Written informed consent was obtained from the participants.

The data were analyzed using SPSS software (version 16.0). Descriptive analysis was performed to examine the prevalence of ADHD clinical symptoms based on DSM-IV criteria. The association of age and gender with the presence of symptoms were

examined using the Chi-square test and *t* test, respectively. To categorize the response to each item of the checklist, lower (0 or 1) and higher (2 or 3) scores were considered without and with ADHD symptoms, respectively. The Pearson correlation test was used to examine the correlation between the total scores of inattention and hyperactivity-impulsivity in terms of age. The total score of inattention and hyperactivity-impulsivity in term of gender was compared using *t* test.  $P < 0.05$  was considered statistically significant.

**RESULTS**

The data records of 1,184 children and adolescent with ADHD were used. Among these, 904 (76.4%) were boys. The participants aged 5.5-19.0 years with the mean age of  $9.29 \pm 2.55$  years. There was no significant difference between genders in terms of the mean total score of hyperactivity-impulsivity (girls:  $2.63 \pm 2.77$  versus boys:  $3.19 \pm 8.17$ ,  $P = 0.28$ ) and the mean total score of inattention (girls:  $3.40 \pm 1.97$  versus boys:  $3.28 \pm 2.00$ ,  $P = 0.4$ ).

The Pearson correlation analysis showed that there was a significant negative association between age and the total score of hyperactivity-impulsivity; the total score of hyperactivity-impulsivity decreased as the age increased. However, the total score of inattention was not associated with age (Table 1). Regarding the 18-item ADHD checklist, there was no difference in the mean age of those with and without the symptoms. Some of the symptoms associated with hyperactivity-impulsivity had a significant association with age (Table 2).

As shown in Table 2, the ratio between boys and girls was 3:1. None of the symptoms of inattentive ADHD were associated with

gender. Out of the nine hyperactivity-impulsivity symptoms, only three symptoms were associated with gender, namely frigidity, often running, and often difficulties with playing and leisure activities. These symptoms were more common in boys than in girls. None of the other fifteen symptoms had a significant association with gender. The items “often inattentive to details or making careless mistakes” and “fails to finish work” were among the most common symptoms of inattentive ADHD in both genders.

**DISCUSSION**

The most common ADHD symptoms in both genders were associated with inattention, whereas hyperactivity-impulsivity symptoms were less common. None of the symptoms of inattentive ADHD were associated with gender. There was no difference between genders in terms of the total score of inattention and hyperactivity-impulsivity. In the context of Iranian culture, our findings indicated that the most common reason for such patients to refer to psychiatry clinics was inattention rather than hyperactivity-impulsivity. The total score of inattention was not related to age, which may indicate a similar attention-deficit severity across different age groups. Cohort studies are required to confirm the stability of attention problems from childhood to adolescence.<sup>7</sup> None of the symptoms of inattentive ADHD were related to age. We found that some hyperactivity-impulsivity symptoms were age-related, which in turn indicated that ADHD screening questions might not be applicable to certain age groups.

There have been some reports in support of biological differences in ADHD symptoms between boys and girls. It has been reported

**Table 1:** Correlation between age and the total score of inattention and hyperactivity-impulsivity

Total score	Analysis	Age
Inattention	Pearson Correlation	-0.01*
	Sig. (2-tailed)	0.7
Hyperactivity-impulsivity	Pearson Correlation	-0.07*
	Sig. (2-tailed)	0.01

\*Correlation is significant at the 0.05 level (2-tailed)

**Table 2:** Association of gender and age with ADHD symptoms

Variables	Boys N(%)	Girls N(%)	X <sup>2</sup>	df	P value*	Age		t	df	P value**
						With symptoms	Without symptoms			
						Mean±SD	Mean±SD			
Often fails to give close attention to details or makes careless mistakes in schoolwork, work, or other activities	424 (47.6)	151 (54.3)	3.83	1	0.05	9.30±2.66	9.28±2.44	-0.104	1167	0.91
Often has difficulty to sustain attention in tasks, play activities, or daily activities	351(40)	112 (41.3)	1.57	1	0.69	9.40±2.55	9.18±2.53	-1.42	1147	0.15
Often does not seem to listen when spoken to directly	357 (39.9)	126 (45.3)	2.58	1	0.1	9.23±2.68	9.34±2.47	738	1171	0.46
Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace	381 (43)	111 (40.1)	0.71	1	0.39	9.15±2.41	9.37±2.61	1.51	1162	0.13
Often has difficulty organizing tasks and activities	346 (39)	102 (36.7)	0.46	1	0.49	9.32±2.50	9.29±2.58	-0.18	1164	0.85
Often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort (e.g., schoolwork, homework)	281 (31.3)	94 (33.8)	0.63	1	0.42	9.38±2.50	9.26±2.57	-0.77	1175	0.44
Often loses things necessary for tasks or activities (e.g., toys, school assignments, pencils, books, tools)	213 (23.8)	67 (24.3)	0.02	1	0.87	9.11±2.30	9.35±2.63	1.32	1169	0.18
Often easily distracted by extraneous stimuli	360 (40.7)	108 (40.1)	0.02	1	0.86	9.26±2.55	9.30±2.54	0.27	1151	0.78
Often appears forgetful	225 (25.5)	75 (27.1)	0.29	1	0.59	2.47±2.41	9.25±2.60	-1.3	1159	0.19
Often fidgets with hands or feet or squirms in seat	286 (31.9)	60 (21.7)	10.64	1	0.001	9.21±2.57	9.31±2.55	0.59	1172	0.55
Often leaves the seat in the classroom or in situations in which remaining seated is expected	288 (32.4)	80 (28.9)	1.23	1	0.26	9.04±2.32	9.37±2.60	2.07	1163	0.03
Often runs about or climbs excessively in situations where it is inappropriate	320 (36)	79 (28.5)	4.69	1	0.03	8.88±2.26	9.48±2.63	3.9	1165	0.001
Often has difficulty playing or engages quietly in leisure activities	257 (28.7)	55 (20.1)	8.06	1	0.005	8.98±2.34	9.37±2.58	2.29	1166	0.02
Often exhibits “on the go” behavior or a pattern of excessive motor activity	264 (29.7)	70 (25.4)	2	1	0.15	9.14±2.40	9.31±2.56	1.03	1163	0.3
Often talks excessively	262 (29.3)	81 (29.0)	0.006	1	0.93	8.93±2.15	9.43±2.68	3.08	1172	0.002
Often blurts out answers before questions have been completed	290 (32.8)	105 (37.5)	2.12	1	0.14	9.22±2.40	9.31±2.60	0.62	1163	0.53
Often has difficulty awaiting one’s turn	303 (34.1)	80 (28.9)	2.62	1	0.1	8.87±2.24	9.48±2.68	3.83	1163	0.001
Often interrupts or intrudes on others (e.g., butts into conversations or games)	317 (35.5)	88 (31.8)	1.29	1	0.27	8.96±2.36	9.44±2.63	3.03	1168	0.002

\*Chi-square test, \*\* t test

that there is a difference in some fronto-subcortical functional networks between boys and girls with ADHD,<sup>16</sup> which are related to cognitive control.<sup>17</sup> A recent study showed that more girls had elevated ADHD symptoms during adolescence compared to boys, while boys showed elevated symptoms from childhood.<sup>18</sup> The symptom “often fails to give close attention to details” was more common in girls than boys. We found that

three hyperactivity-impulsivity symptoms were correlated with gender, namely “often fidgets with hands or feet or squirms in seat”, “often runs about or climbs excessively in situations where it is inappropriate” and “often has difficulty playing or engages quietly in leisure activities.” These symptoms were more common in boys than in girls.

The results of the present study indicated that ADHD screening questions should not be

the same for both genders. For young boys, it should focus on fidgety and running about or climbing, whereas in girls it should focus on close attention to details or making careless mistakes. Among our clinical samples, we found that the severity of inattention and hyperactivity-impulsivity symptoms were not different between boys and girls, whereas a difference was reported in the general population.<sup>3</sup> Our results indicated that girls with severe types of ADHD referred to clinics, while those with milder types were either ignored or not detected based on the current symptoms.

The main limitation of the present study was the inclusion of patients' records solely from clinics affiliated to Shiraz University of Medical Sciences, which undermined the generalizability of our findings.

## CONCLUSION

The most common ADHD symptom in children and adolescents was related to the variable often fails to give close attention to details or makes careless mistakes in schoolwork, at work, or other activities. This variable was not associated with gender. While the severity of inattention symptoms was not associated with age, the severity of hyperactivity/impulsivity decreased with an increase in age.

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**Conflict of Interest:** None declared.

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